

AN INTERESTING OBSERVATION ON THE ZYGOSPORE FORMATION IN THE DESMIDS

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KEY WORDS New observation, desmids, zygospore formation.

SUMMARY. — Zygospores of the two desmids, *Cosmarium maculatum* Turner and *Xanthidium kalimentanum* Scott and Prescott, have been studied. These zygospores, after complete growth, show breaking of the outer wall to release the inner protoplasm out. The released protoplasm with thin membrane develops new thick wall with new ornamentations.

RÉSUMÉ. — Les zygospores de 2 desmidiées, *Cosmarium maculatum* Turner et *Xanthidium kalimentanum* Scott et Prescott, montrent, après une complète croissance une rupture de leur paroi externe pour libérer le protoplasme. Ce protoplasme, pourvu d'une mince membrane, développe une nouvelle paroi, épaisse, porteuse d'ornementations.

INTRODUCTION

During the systematic survey of desmids of Karnataka State, samples collected from two small freshwater ponds in Uttara Kannada District showed conjugation and zygospore formation in good many desmid species. These ponds, Halagere Pond and Siddapur Pond, with a maximum area of about 300 sq. meters, were situated in open rice fields. These ponds had a maximum depth of 2 meters and the main macrovegetation was of *Hydrilla*. Uttara Kannada District receives an average rainfall of 3,686.97 mm and temperature ranges from 16.5°C to 35.8°C.

OBSERVATIONS AND CONCLUSIONS

In the sample obtained from Halagere Pond *Cosmarium maculatum* Turner showed more frequency of conjugation than *Xanthidium kalimentanum* Scott and Prescott collected from Siddapur Pond. Detailed study of zygospores of

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these desmids revealed an unusual development of ornamentation. Conjugation occurs in recently divided daughter cells in *Cosmarium maculatum* Turner where, the new semicells are smaller than parent semicells. A fully developed zygospor of this desmid is spherical in shape, yellowish-green in colour and covered with stout, pointed, curved spines which originate from a conical base (Pl. 1, fig. 1; Pl. 3, fig. 1). The protoplasm of this zygospor contracts a little separating the outer spiny wall (Pl. 1, fig. 2a; Pl. 3, fig. 2). The latter breaks open to release protoplasm as a single mass with a thin smooth wall around it (Pl. 1, fig. 2b; Pl. 3, fig. 3). The released protoplasm becomes undulate (Pl. 1, fig. 3; Pl. 3, fig. 4). Further changes will take place in two ways. In the first case, the undulations become prominent and ultimately develop into broad-based, narrow tipped and perforated protuberances (Pl. 1, fig. 5; Pl. 3, fig. 5). In the second case, small spines develop immediately at the region of undulations (Pl. 1, fig. 4; Pl. 3, fig. 6). These spines are forked 2 to 5 times. At maturity the new wall shows perforated protuberances with forked spines passing through the perforations (Pl. 1, fig. 6; Pl. 3, fig. 7). Such structures are yellowish-brown in the beginning but become deep brown later.

A similar behaviour has also been observed in *Xanthidium kalimentanum* Scott and Prescott in the present study. The zygospor, in the first step, will be smooth walled (Pl. 2, fig. 1) which breaks to release the spherical protoplasm with thin wall (Pl. 2, fig. 2-3; Pl. 3, fig. 8). The new wall developed shows pitted ornamentations (Pl. 2, fig. 4).

According to FRITSCH (1935) during germination of zygosporos in Desmidiaceae, nucleus divides meiotically and then contents escape from outer envelopes of the spore to divide and form two individuals (p. 353). In the present observation zygosporos of the two desmids are yellowish-green in colour and develop thick walls. They germinate to give rise to one celled rounded structures, which also rest and develop thickenings that are different from the first formed zygosporos. The colour of the zygosporos here is deep brown. These probably later undergo meiotic division to give rise to two individuals as is normally the case in desmids. It thus appears that there is an interpolation of a diploid one celled generation before the spore undergoes reduction division to form two haploid individuals. This phenomenon appears entirely new and needs to be further cytologically investigated.

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TEXT FOR PLATES

Plate 1

Fig. 1-6 : *Cosmarium maculatum* Turner. — 1. Zygosporé with parent semicells. 2. a. Zygosporé with contracted protoplasm. 2. b. Breaking of outer spore wall and release of protoplasm. 3. Released protoplasm with undulate wall. 4. Development of branched spines emerging through protuberances. 5. Matured spore with only perforated protuberances. 6. Matured spore with branched spines passing through perforated protuberances.

Plate 2

Fig. 1-4 . *Xanthidium kalimentanum* Scott and Prescott. 1. Zygosporé with parent semicells. 2. a. Zygosporé showing contracted protoplasm. 2. b. and 3 : Breaking of outer wall and release of inner protoplasm. 4 . Released spore with new ornamentation on wall.

Plate 3

(Photomicrographs)

Fig. 1-7 . *Cosmarium maculatum* Turner. — 1. Zygosporé with parent semicells. 2. Zygosporé with contracted protoplasm. 3. Breaking of outer spore wall and release of protoplasm. 4. Released protoplasm with undulate wall. 5 : Matured spore with only perforated protuberances. 6 : Development of branched spines emerging through protuberances. 7. Matured spore with branched spines passing through perforated protuberances.

Fig. 8 : *Xanthidium kalimentanum* Scott and Prescott. Release of protoplasm, with new ornamentation, by breaking of outer wall.

PLATE 1.

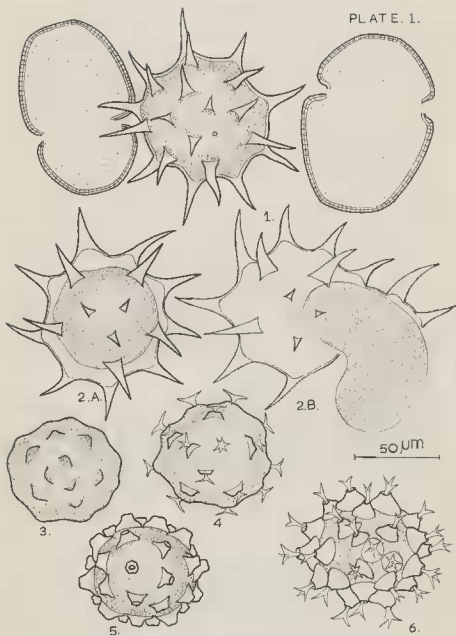


Plate 1

PLATE 2.

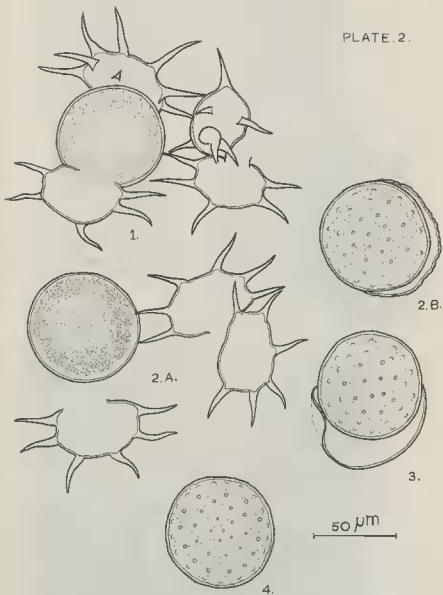


Plate 2

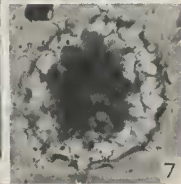
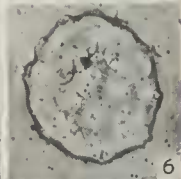
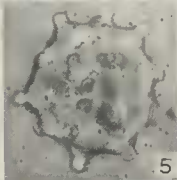
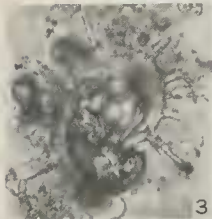
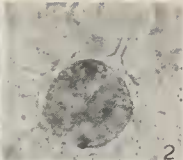


Plate 3